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quæ erunt *Æquationis* datæ Radices omnes reales; hæ nempe ad dextram erunt Radices affirmativæ, illæ verò ad finiftram Radices negativæ. Demonstratio est manifesta ex præcedentibus, habita tantùm ratione Parabolæ per puncta B, C, c, x, x tranſeantis. Nam poſito F foco Parabolæ, (cujus diſtantiâ à Vertice aſt  $\frac{1}{2}$  ON,) notum eſt quod lineæ omnes ut FB + BQ, FC + CD, &c, eandem ubique conficiant ſummam.

Atque ex principiis hic poſitis proclive erit Inſtrumentum haud inconcinnum & quantumvis accuratum fabricari, cujus beneficio hujusmodi *Æquationum* quarumcunque Radices nullo fere negotio inveniri poſſint, & præ oculis exhiberi. Hoc autem quilibet, ſi id Curæ ſit, variis modis pro ingenio ſuo efficere poteſt, & de his jam ſatis.

III. *Æquationum* quarundam Potestatis tertiæ, quintæ, ſeptimæ, nonæ, & ſuperiorum, ad infinitum uſque pergendo, in terminis finitis, ad inſtar Regularum pro Cubicis quæ vocantur Cardani, *Reſolutio Analytica.*

Per Ab. De Moivre, R. S. S.

Si n Numerus quicunque, y quantitas incognita, ſive *Æquationis* Radix quæſita, ſitque a quantitas quævis omnino cognita, ſive ut vocant Homogeneum Comparationis: Atque horum inter ſe relatio exprimat per *Æquationem*

$$ny + \frac{nn - 1}{2 \times 3} ny^3 + \frac{nn - 1}{2 \times 3} \times \frac{nn - 9}{4 \times 5} ny^5 + \frac{nn - 1}{2 \times 3} \times \frac{nn - 9}{4 \times 5} \times \frac{nn - 25}{6 \times 7} ny^7, \&c. = a$$

Ex hujus seriei natura manifestum est, quod si n sumatur numerus aliquis impar (integer scilicet, nec refert utrum sit affirmativus vel negativus) tunc series sponte sua terminabitur, & Aequatio fit una ex supra præfinitis, cujus Radix est

$$(1) \quad y = \frac{1}{2} \sqrt[n]{\sqrt[n]{1+aa+a} - \frac{\frac{1}{2}}{\sqrt[n]{\sqrt[n]{1+aa+a}}}}$$

$$\text{vel } (2) \quad y = \frac{1}{2} \sqrt[n]{\sqrt[n]{1+aa+a} - \frac{1}{2} \sqrt[n]{\sqrt[n]{1+aa} - a}}$$

$$\text{vel } (3) \quad y = \frac{\frac{1}{2}}{\sqrt[n]{\sqrt[n]{1+aa} - a}} - \frac{1}{2} \sqrt[n]{\sqrt[n]{1+aa} - a}$$

$$\text{vel } (4) \quad y = \frac{\frac{1}{2}}{\sqrt[n]{\sqrt[n]{1+aa} - a}} - \frac{\frac{1}{2}}{\sqrt[n]{\sqrt[n]{1+aa} - a}}$$

Exempli gratia, sit hujus Aequationis potestatis quintæ  
 $5y + 20y^3 + 16y^5 = 4$  Radix invenienda, quo in casu erit  $n = 5$  &  $a = 4$ . Radix juxta formam primam erit  $y = \frac{1}{2} \sqrt[5]{\sqrt[5]{17+4} - \frac{1}{2}}$ , quæ in numeris vul-

garibus expeditissime explicari potest ad hunc modum. Est  $\sqrt[5]{17+4} = 8.1231$ , cujus Logarithmus 0.9097164, & hujus pars quinta 0.1819433, huic respondens numerus est

1.5203 =  $\sqrt[5]{\sqrt[5]{17+4}}$ . Ipsius vero 0.1819433 Complementum Arithmeticum est 9.8180567. cui respondet numerus 0.6577 =  $\frac{1}{\sqrt[5]{\sqrt[5]{17+4}}}$  Igitur horum numero-

rum semidifferentia 0.4313 = y.  
 14 Q.

Hic venit Observandum quod loco Radicis generalis, non incommode sumeretur  $y = \frac{1}{2} \sqrt[n]{2a} - \frac{1}{\sqrt[n]{2a}}$ , si quan-

do numerus a respectu unitatis, si satis magnus, ut si Æquatio fuerit  $5y + 20y^3 + 16y^5 = 682$ , erit Log.  $2a = 3.1348143$ , cujus pars quinta 0.6269628, & huic respondens numerus 4.236. Complementi autem Arithmetici 9.3730372 numerus est 0.236 & horum numerorum semidifferentia  $2 = y$ .

Atqui præterea, si in Æquatione præcedenti signa alternatim sint affirmantia & negantia, vel quod eodem redit, si series obvenierit hujus modi

$$ny + \frac{1 - nn}{2 \times 3} ny^3 + \frac{1 - nn}{2 \times 3} \times \frac{9 - nn}{4 \times 5} ny^5 + \frac{1 - nn}{2 \times 3} \times \frac{9 - nn}{4 \times 5} \times \frac{25 - nn}{6 \times 7} ny^7, \&c. = a$$

erit hujus Radix

$$(1) \quad y = \frac{1}{2} \sqrt[n]{a + \sqrt{aa - 1}} + \frac{n \frac{1}{2}}{\sqrt[n]{a + \sqrt{aa - 1}}}$$

$$\text{vel } (2) \quad y = \frac{1}{2} \sqrt[n]{a + \sqrt{aa - 1}} + \frac{1}{2} \sqrt[n]{a - \sqrt{aa - 1}}$$

$$\text{vel } (3) \quad y = \frac{n \frac{1}{2}}{\sqrt[n]{a - \sqrt{aa - 1}}} + \frac{1}{2} \sqrt[n]{a - \sqrt{aa - 1}}$$

$$\text{vel } (4) \quad y = \frac{\frac{1}{2}}{\sqrt[n]{a - \sqrt{aa - 1}}} + \frac{\frac{1}{2}}{\sqrt[n]{a + \sqrt{aa - 1}}}$$

Hic autem Notandum, quod si  $\frac{n-1}{2}$  numerus extiterit impar, Radicis inventæ signum in ei contrarium permutandum est.

Pro.

Proponatur Aequatio  $5y - 20y^3 + 16y^5 = 6$ , unde  
 $n = 5$  &  $a = 6$ . Erit Radix  $= \frac{1}{2} \sqrt[5]{6 + \sqrt{35}} + \frac{1}{2}$

$$\sqrt[5]{6 + \sqrt{35}}$$

Vel quoniam  $6 + \sqrt{35} = 11.916$ , erit hujus logarithmus  $1.0761304$  & ejus pars quinta  $0.2152561$ , Complementum vero Arithmeticum  $9.7847439$ . Horum Logarithmorum numeri sunt  $1.6415$  &  $0.6091$  respective, quorum semisumma  $1.1253 = y$ .

Verum si acciderit ut  $a$  sit minor unitate, tunc Radicis forma secunda, ut quæ proposito est magis conveniens, præ reliquis feligenda est. Sic si Aequatio fuerit  $5y - 20y^3$

$$+ 16y^5 = \frac{61}{64}, \text{ erit } y = \frac{1}{2} \sqrt[5]{\frac{61}{64} + \sqrt{\frac{375}{4096}}}$$

$+ \frac{1}{2} \sqrt[5]{\frac{61}{64} - \sqrt{\frac{375}{4096}}}$ . Et quidem si Binomialium Radix quintana ullo pacto extrahi queat, prodibit Radix proba & possibilis, etsi expressio ipsa impossibilitatem mentiat. Binomialis vero  $\frac{61}{64} + \sqrt{\frac{375}{4096}}$  Radix quintana est  $\frac{1}{4} + \frac{1}{4}\sqrt{-15}$ , & Binomialis  $\frac{61}{64} - \sqrt{\frac{375}{4096}}$  Radix itidem quintana est  $\frac{1}{4} - \frac{1}{4}\sqrt{-15}$ , quorum Binomialium semisumma  $= \frac{1}{4} = y$ .

Si autem extractio ista vel non peragi posset, vel etiam difficilior videretur, res ubique confici potest per Tabulam sinuum naturalium ad modum sequentem.

Ad Radium 1 sit  $a = \frac{61}{64} = 0.95112$  sinus arcus cujusdam, qui proinde erit  $72^\circ : 23'$  cujus pars quinta (eo quod  $n = 5$ ) est  $14^\circ : 28'$ ; hujus sinus  $0.24981 = \frac{y}{4}$  proxime. Nec secus procedendum in Aequationibus graduum superiorum.